HVAC Inverter

HVAC Inverter H2

Easy-to-use, robust inverters dedicated to fan and pump control

Beijer
ELECTRONICS

Dedicated to fans and pumps

Beijer Electronics offers IP20, IP55 and IP66 inverters for HVAC, maritime and other industrial applications and sets a new cost-effective standard for dedicated fan and pump control. Ease-of-use and innovative design combined with robust performance provides powerful flow control and reliability in a compact drive.

The Beijer Electronics HVAC Inverter H2 is available in different frame sizes in the range of 0.75-160 kW with a variety of options, including for example single or three phase input, communication boards, power switch etc.

“ Energy efficient flow control from reliable, compact drives, ideal for HVAC systems

Cumulative savings

Save energy

- Highly efficient operation.
- Automatic optimization when load decreases.
- Built-in sleep mode prevents lost energy when flow is low or zero.

Save money

- Advanced features as standard.
- Options for additional flexibility.
- Built-in-PLC.

Save time

- Simple parameter set allows fast installation and commissioning.
- PC programming and Optistick make programming a breeze.
- Customizable OLED display.
- Pluggable terminals.

Noise reduction

Quiet motor operation

- High switching frequency selection (up to 32 kHz) ensures motor noise is minimized.

Quiet system mechanics

- Simple skip frequency selection avoids stresses and nuisance noise caused by mechanical resonance.

Quiet drive operation

- Temperature-controlled cooling fans ensure quiet operation in periods of reduced load.

Noise reduction through speed control

- Optimizing motor speed gives significant energy savings and reduces motor noise.

PID control

- The HVAC Inverter H2 has a PID controller built-in that is fully integrated with both HVAC and energy efficient features and is packaged in a user friendly way to ensure ease-of-use and fast commissioning. Now in the majority of applications, it has become possible to eliminate the need for external controllers.

Manual/auto

- Allows manual control (of fan or pump) to easily be selected in the event of an automatic control system failure or for simplified commissioning/system checks, or when a fast temporary override of the control system is required. Built in auto control selection allows return to automatic system control just as easily.

Energy efficient fan control

Fire override mode

Fire override mode ignores signals and alarms, keeping the HVAC Inverter H2 operating for as long as possible.

- This feature is crucial for ensuring smoke extraction from buildings in the event of a fire.
- Selectable logic means that the HVAC Inverter H2 can be easily configured to the signal produced by your fire management system.
- With an independently set speed for fire mode operation, selectable as either forward or reverse direction, the HVAC Inverter H2 has the flexibility to match the needs of your fire control system.

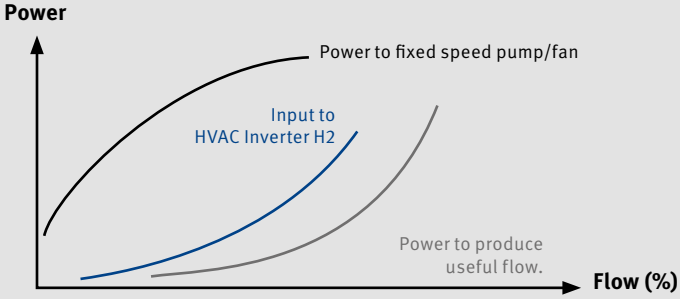
Stairwell pressurization

In the event of a fire, stairwells are often essential escape routes.

- HVAC Inverter H2 can be used to control air flow and pressure to help keep stairwells clear of smoke to allow safe evacuation and give firefighters safe access to buildings.

Energy savings

HVAC Inverter H2 power savings.
With variable speed control, HVAC Inverter H2 provides instant savings.



Energy optimization and monitoring

- The advanced optimization function intelligently matches energy usage to the driven load to ensure your fan operates at maximum efficiency. The built-in energy consumption meters allow energy consumption to be clearly displayed and savings to be calculated.

Intelligent standby

- To reduce energy used by slow-running fans, HVAC Inverter H2 has an intelligent standby/sleep function to shut off output from the drive until demand for air flow increases.

Broken belt detection

- HVAC Inverter H2 intelligently monitors current/speed to provide immediate warning of broken belts between motors and ventilation fans.

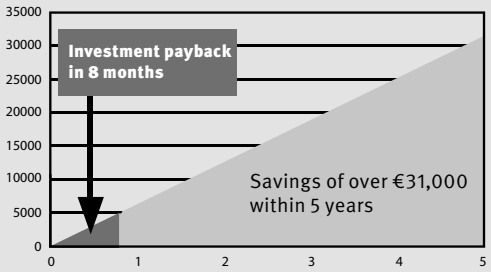
Resonance avoidance

- HVAC Inverter H2 can be easily configured to avoid frequencies that cause resonance in ventilation systems, preventing unnecessary noise and mechanical damage to motors and fans.

Using HVAC Inverter H2 compared to direct on line control, an estimated 20% reduction in speed results in potential energy savings of 50%.

Calculation based on a typical estimated factory working week and energy costs, including estimated component and installation costs.

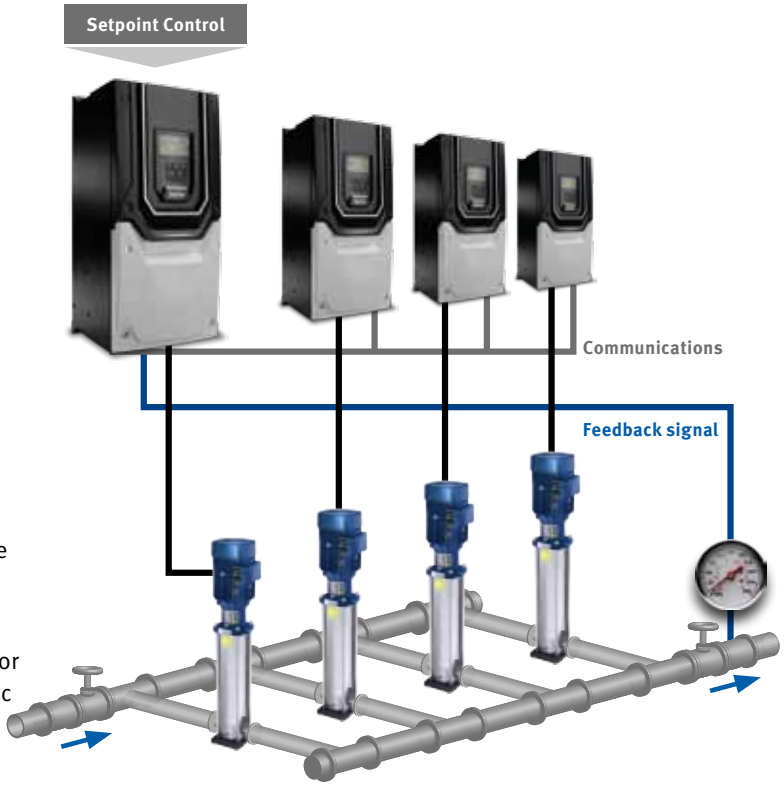
Example savings based on a 45kW load

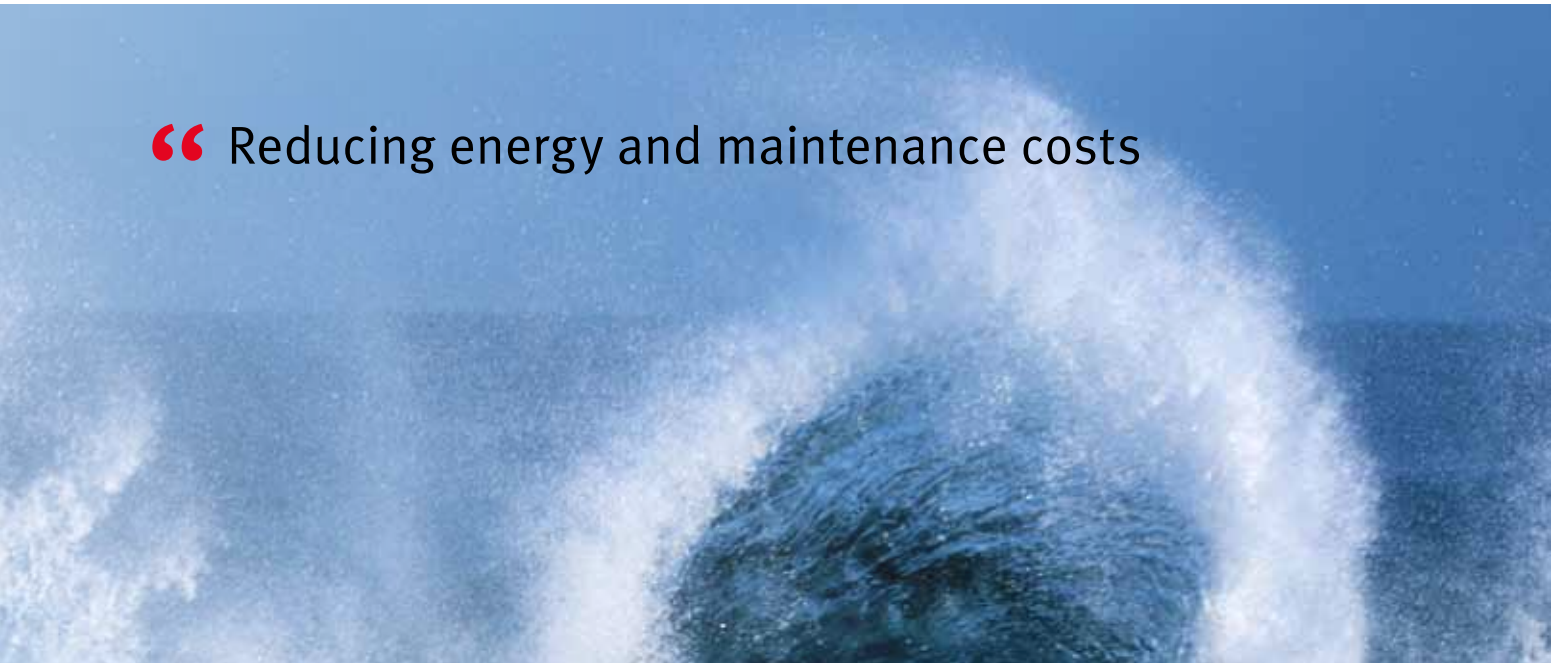


Energy efficient pump control

Coordinated pump station control, built into each HVAC Inverter H2 as standard, allows independent control of multiple pump applications.

- All drives operate at variable speed for maximum energy saving.
- Equal runtime sharing across every pump.
- Automatic system reconfiguration in the event of a pump fault (including the master pump).
- Continued system operation when drives are individually powered off (including the master drive).
- Communication and +24V control voltage shared between drives via a standard RJ45 patch lead.
- Independent maintenance indicators for each pump.
- Any pump can be switched to manual operation at the touch of a button, and will automatically rejoin the network when switched back to auto.
- For waste water applications, each pump can be set for blockage/ragging detection and activate an automatic de-ragging/pump cleaning cycle.
- Optional mains isolator with lock-off for safe pump maintenance.
- Function configured through simple parameter set-up and intelligent-drive self-configuration.





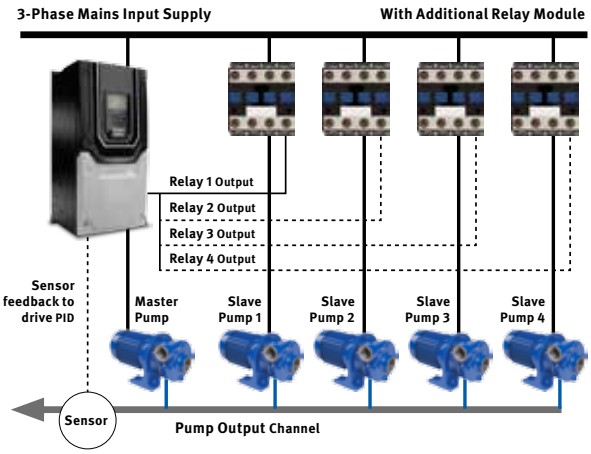
Reducing energy and maintenance costs

Pump efficiency

Built-in sleep mode with auto-boost. Sleep mode saves energy by detecting when a pump is running inefficiently and producing little useful work. The HVAC Inverter H2 can be programmed to enter into a sleep/disabled mode until the demand increases. To help prevent sleep mode oscillation, the inverter can automatically initiate a boost cycle to increase pressure on starting or stopping.

Drive controlled bypass

Intelligent features within the HVAC Inverter H2 allow a bypass circuit to be implemented. Activation of bypass mode can be determined intelligently by the HVAC Inverter H2 drive based on a command from the building management system. The drive can be set to automatically select bypass mode when entering into a trip condition ensuring minimal disruption to service.



Avoid pump downtime

Blockage detect/clear
HVAC Inverter H2 can detect pump blockages and trigger a programmed cleaning cycle to automatically clear them, preventing downtime.

Pump clean/stir cycle
Triggered by a settable period of inactivity, a configurable cleaning cycle can be run to clear sediment, ensuring the pump is ready to run when needed.

Dry run protection
HVAC Inverter H2 can evaluate a pump's speed/power and shut it off or warn when the pump starts to run dry, protecting it from heat/friction damage.

Motor preheat function
HVAC Inverter H2 features a motor preheat function to help ensure moisture is not permitted to collect on the motor during periods of inactivity and prior to motor start-up. In addition, the motor preheat function can be used to keep condensation from developing on the motor as the motor cools down immediately following a stop. The feature is fully configurable, meaning the pump can be always available the instant it is required.

Burst pipe protection
After enabling the drive, the PID-feeback needs to exceed a programmed value within a programmed so as to avoid burst pipes.

Relay cascade control (requires optional cascade module)
Variable speed duty pump with up to 4 assist pumps, the HVAC Inverter H2 can provide automatic operating time monitoring and balancing for assist pumps to share duty cycle. Runtime clocks for all fixed speed assist pumps are maintained and visible within the HVAC Inverter H2 for integration into the pump system maintenance schedules.

Options and accessories

BACnet & Modbus RTU compatibility built-in as standard

BACnet
Modbus

Enclosure options

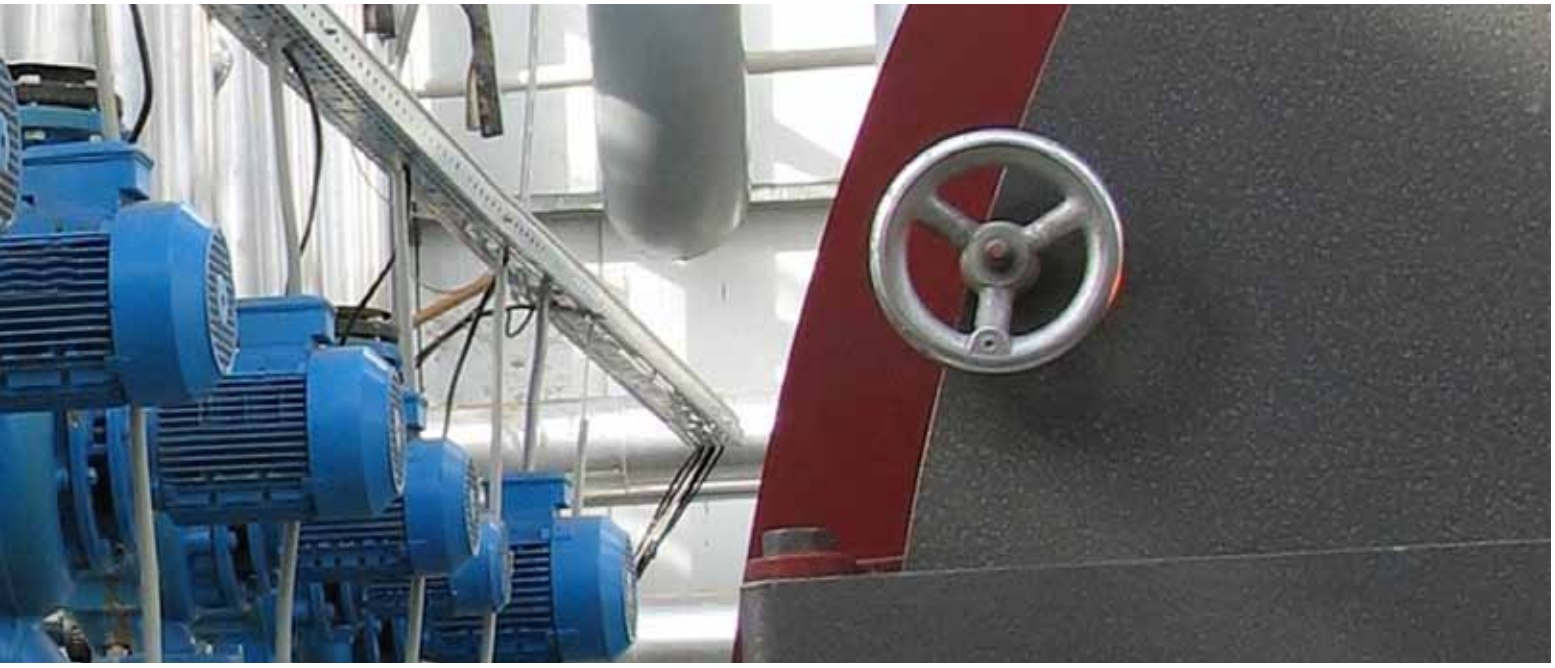
IP66/NEMA 4
- Sizes 2 and 3
- Dust-tight and protected against high-pressure water jets
- Available with or without isolator switch

IP20
- Sizes 2 and 3

IP55/NEMA 12
- Sizes 4–7
- Protected against dust and jets of water
- Isolator switch as an option

OLED display

Installed as standard on all IP55 and IP66 models
- Clear graphical display
- Operates to –10°C
- Wide viewing angle, effective in dark and light conditions
- Customizable display
- Multi-language selection



Powerful PC software, BFI Tools

- Drive commissioning and parameter backup
- Real-time parameter editing
- Drive network communication
- Parameter upload, download and storage
- Simple PLC function programming
- Compatible with Windows XP, Windows Vista and Windows 7

Plug-in modules

Extend functionality and communication options

Expansion modules:

- Extended I/O
- (3 x digital in, 1 x relay out)
- Cascade control (extended relay)
- (3 x relay outputs

Fieldbus interfaces

BACnet/IP, Profibus DP, DeviceNet and Ethernet/IP, EtherCAT, Modbus TCP. Profinet, CC-Link

Remote keypad

- Remote keypad and OLED display
- IP55 panel mount touch-sensitive operator interface

Optistick

Bluetooth®

- Rapid commissioning tool
- Plug-in or wirelessly copy parameter sets between drives

BACnet EtherNet/IP PROFIBUS DeviceNet EtherCAT Modbus TCP PROFINET CC-Link

Order number	Description	Part Number
BFI-H2, 1-phase 230 V AC, IP20, EMC-filter, LED,		
BFI-H2-22-0043-1F12-SN	0,75kW, 4,3A, Size 2	62101
BFI-H2-22-0070-1F12-SN	1.5kW, 7A, Size 2	62103
BFI-H2-22-0105-1F12-SN	2,2kW, 10,5A, Size 2	62105
BFI-H2, 1-phase 230 V AC, IP66, EMC-filter, OLED		
BFI-H2-22-0043-1F1X-TN	0,75kW, 4,3A, Size 2	62111
BFI-H2-22-0070-1F1X-TN	1,5kW, 7A, Size 2	62113
BFI-H2-22-0105-1F1X-TN	2,2kW, 10,5A, Size 2	62115
BFI-H2, 1-phase 230 V AC, IP66, EMC-filter, OLED, Mainswitch		
BFI-H2-22-0043-1F1D-TN	0,75kW, 4,3A, Size 2	62121
BFI-H2-22-0070-1F1D-TN	1,5kW, 7A, Size 2	62123
BFI-H2-22-0105-1F1D-TN	2,2kW, 10,5A, Size 2	62125
BFI-H2, 3-phase 230 V AC, IP20, EMC-filter, LED,		
BFI-H2-22-0043-3F12-SN	0,75kW, 4,3A, Size 2	62131
BFI-H2-22-0070-3F12-SN	1.5kW, 7A, Size 2	62133
BFI-H2-22-0105-3F12-SN	2,2kW, 10,5A, Size 2	62135
BFI-H2-32-0180-3F12-SN	4,0kW, 18A, Size 3	62137
BFI-H2-32-0240-3F12-SN	5,5kW, 24A, Size 3	62139
BFI-H2, 3-phase 230 V AC, IP66, EMC-filter, OLED		
BFI-H2-22-0043-3F1X-TN	0,75kW, 4,3A, Size 2	62151
BFI-H2-22-0070-3F1X-TN	1.5kW, 7A, Size 2	62153
BFI-H2-22-0105-3F1X-TN	2,2kW, 10,5A, Size 2	62155
BFI-H2-32-0180-3F1X-TN	4,0kW, 18A, Size 3	62157
BFI-H2, 3-phase 230 V AC, IP66, EMC-filter, OLED, Mainswitch		
BFI-H2-22-0043-3F1D-TN	0,75kW, 4,3A, Size 2	62191
BFI-H2-22-0070-3F1D-TN	1,5kW, 7A, Size 2	62193
BFI-H2-22-0105-3F1D-TN	2,2kW, 10,5A, Size 2	62195
BFI-H2-32-0180-3F1D-TN	4,0kW, 18A, Size 3	62197
BFI-H2, 3-phase 230 V AC, IP55, EMC-filter, OLED		
BFI-H2-42-0240-3F1N-TN	5,5kW, 24A, Size 4	62159
BFI-H2-42-0300-3F1N-TN	7,5kW, 30A, Size 4	62161
BFI-H2-42-0460-3F1N-TN	11kW, 46A, Size 4	62163
BFI-H2-52-0610-3F1N-TN	15kW, 61A, Size 5	62165
BFI-H2-52-0720-3F1N-TN	18,5kW, 72A, Size 5	62167
BFI-H2-62-0900-3F1N-TN	22kW, 90A, Size 6	62169
BFI-H2-62-1100-3F1N-TN	30kW, 110A, Size 6	62171
BFI-H2-62-1500-3F1N-TN	37kW, 150A, Size 6	62173
BFI-H2-62-1800-3F1N-TN	45kW, 180A, Size 6	62175
BFI-H2-72-2020-3F1N-TN	55kW, 202A, Size 7,	62177
BFI-H2-72-2480-3F1N-TN	75kW, 248A, Size 7	62179
BFI-H2, 3-phase 400 V AC, IP20, EMC-filter, LED		
BFI-H2-24-0022-3F12-SN	0,75kW, 2,2A, Size 2	62211
BFI-H2-24-0041-3F12-SN	1,5kW, 4,1A, Size 2	62213
BFI-H2-24-0058-3F12-SN	2,2kW, 5,8A, Size 2	62215
BFI-H2-24-0095-3F12-SN	4kW, 9,5A, Size 2	62217
BFI-H2-34-0140-3F12-SN	5,5kW, 14A, Size 3	62219
BFI-H2-34-0180-3F12-SN	7,5kW, 18A, Size 3	62221
BFI-H2-34-0240-3F12-SN	11kW, 24A, Size3	62223
BFI-H2, 3-phase 400 V AC, IP66, EMC-filter, OLED		
BFI-H2-24-0022-3F1X-TN	0,75kW, 2,2A, Size 2	62231
BFI-H2-24-0041-3F1X-TN	1,5kW, 4,1A, Size 2	62233
BFI-H2-24-0058-3F1X-TN	2,2kW, 5,8A, Size 2	62235
BFI-H2-24-0095-3F1X-TN	4kW, 9,5A, Size 2	62237
BFI-H2-34-0140-3F1X-TN	5,5kW, 14A, Size 3	62239
BFI-H2-34-0180-3F1X-TN	7,5kW, 18A, Size 3	62241
BFI-H2, 3-phase 400 V AC, IP66, EMC-filter, OLED, Mainswitch		
BFI-H2-24-0022-3F1D-TN	0,75kW, 2,2A, Size 2	62281
BFI-H2-24-0041-3F1D-TN	1,5kW, 4,1A, Size 2	62283
BFI-H2-24-0058-3F1D-TN	2,2kW, 5,8A, Size 2	62285
BFI-H2-24-0095-3F1D-TN	4kW, 9,5A, Size 2	62287
BFI-H2-34-0140-3F1D-TN	5,5kW, 14A, Size 3	62289
BFI-H2-34-0180-3F1D-TN	7,5kW, 18A, Size 3	62291
BFI-H2, 3-phase 400 V AC, IP55, EMC-filter, OLED		
BFI-H2-44-0240-3F1N-TN	11kW, 24A, Size 4	62243
BFI-H2-44-0300-3F1N-TN	15kW, 30A, Size 4	62245
BFI-H2-44-0390-3F1N-TN	18kW, 39A, Size 4	62247
BFI-H2-44-0460-3F1N-TN	22kW, 46A, Size 4	62249
BFI-H2-54-0610-3F1N-TN	30kW, 61A, Size 5	62251
BFI-H2-54-0720-3F1N-TN	37kW, 72A, Size 5	62253
BFI-H2-64-1100-3F1N-TN	55kW, 110A, Size 6	62257
BFI-H2-64-1500-3F1N-TN	75kW, 150A, Size 6	62259
BFI-H2-64-1800-3F1N-TN	90kW, 180A, Size 6	62261
BFI-H2-74-2020-3F1N-TN	110kW, 202A, Size 7	62263
BFI-H2-74-2400-3F1N-TN	132kW, 240A, Size 7	62265
BFI-H2-74-3020-3F1N-TN	160kW, 302A, Size 7	62267
**All drives above can be ordered with Full conformal coating*		

Order number	Description	Part Number
Internal Options		
ABCC-DEV-2	Devicenet Module	63120
ABCC-ECT	EtherCat 2-port Module	63163
ABCC-DPV1-2	Profibus DP D-sub Module	63142
ABCC-PRT_2P	ProfiNet 2 port Module	63164
ABCC-EIT_2P	Modbus TCP 2 port Module	63165
ABCC-CCL	CC-Link Module	63250
ABCC-EIPT_2P	Ethernet IP 2 port Module	63122
OPT-2-EXTIO-BFI	Extended I/O	63123
OPT-2-CASCD-BFI	Extended Relay	63119
External Options		
OPT-2-ISOL4-BFI	Isolator Switch Box, Size 4	63150
OPT-2-ISOL5-BFI	Isolator Switch Box, Size 5	63151
OPT-2-OPPAD-BFI	OLED Remote External Keypad	63201
OPT-2-STICK-BFI	Optistick Bluetooth communication, loading parameters	63143
OPT-J4505-BFI	RS-485 Data Cable 0,5m	63144
OPT-J4510-BFI	RS-485 Data Cable 1,0m	63145
OPT-J4530-BFI	RS-485 Data Cable 3,0m	63146
OPT-2-J45SP	RS-485 2-port Data Cable Splitter	63148
OPT-2-RJTRM-BFI	RJ45 Termination Plug	63202
CAB113	3m cable with 9-pole D-sub and RJ-45 between TxA/B/C and BFI-H2/P2/E2	660000290
CAB114	3m cable for screwterminals and RJ-45 between PLC and BFI-H2/P2/E2	660000291
BFI-Tools PLC-licence	BFI-Tools PLC-licence	63300

Options

- RFI line filter
- Mains supply input chokes
- Motor output filter, recommended for long cable runs
- 2 relay output option
- 2 relay output for HVAC operation
- High voltage logic input option
- Remote mounting keypad
- RJ45 cables and splitters
- Isolated RS485 USB adaptor
- Main switch option
- Commissioning and storage software for PC
- DeviceNet, Profibus and Ethernet gateways

NOT TO SCALE

Size	2	2	3	3	4	5	6	7
Enclosure	IP20	IP66	IP20	IP66	IP55	IP55	IP55	IP55
Height (mm)	221	257	261	310	440	540	865	1280
Width (mm)	112	188	131	211	171	235	330	330
Depth (mm)	185	238	205	256	240	270	330	360
Weight (kg)	1.8	4.8	3.5	7.3	11.5	22.5	50	80

Drive specification

Input ratings	**Supply voltage**	200 – 240V ± 10% 380 – 480V ± 10%
	Supply frequency	48 – 62Hz
	Displacement power factor	› 0.98
	Phase imbalance	3% maximum allowed
	Inrush current	‹ rated current
	Power cycles	120 per hour maximum, evenly spaced
Output ratings	**Output power**	230V 1 phase input: 0.75–2.2kW 230V 3 phase input: 0.75–75kW 400V 3 phase input: 0.75–250kW
	Overload capacity	110% for 60 seconds, 125% for 3 seconds
	Output frequency	0 – 120Hz, 0.1Hz resolution
	Typical efficiency	98%
Ambient conditions	**Temperature**	Storage : –40 to 60°C Operating : –10 to 40°C
	Altitude	Up to 1000m ASL without derating Up to 2000m maximum UL approved Up to 4000m maximum (non UL) Above 1000m : derate by 1% per 100m
	Humidity	95% max, non-condensing
Enclosure	**Ingress Protection**	IP20 (Frame sizes 2 & 3) IP66 (Frame sizes 2 & 3; up to 7.5kW) IP55 (Frame sizes 4 – 7)
Programming	**Keypad**	Built-in keypad as standard Optional remote mountable keypad
	Display	Built-in multi language OLED display (except IP20) LED display (IP20 only)
	PC	BFI-Tools

Control specification	**Control method**	Variable torque V/F Variable torque energy optimised V/F Constant torque U/F	
	PWM frequency	4 – 32kHz effective	
	Stopping mode	Ramp to stop : user adjustable 1 – 600 seconds coast to stop	
	Braking	Motor flux braking	
	Skip frequency	Single point, user adjustable	
	Setpoint control	Analog signal	0 to 10 Volts, 10 to 0 Volts –10 to +10 Volts 0 to 20mA, 20 to 0mA, 4 to 20mA, 20 to 4 mA
		Digital	Motorised potentiometer (Keypad) Modbus RTU BACnet
Communication	**Supported protocols**	Modbus RTU - standard BACnet - standard Profibus DP - option Ethernet IP - option Modbus TCP - option EtherCAT - option DeviceNet - option Profinet - option CC-Link - option	
I/O specification	**Power supply**	24 volt DC, 100mA, short circuit protected 10 volt DC, 5mA for potentiometer	
	Programmable inputs	5 total as standard (optional additional 3) 3 digital (optional additional 3) 2 analog / digital selectable PTC-input	
	Digital inputs	10 – 30 volt DC, internal or external supply, NPN response time : ‹ 4ms	
	Analog inputs	Resolution : 12 bits Response time : ‹ 4ms Accuracy : ‹ 1% full scale Parameter adjustable scaling and offset	
	Programmable outputs	4 total (optional additional 3) 2 analog / digital 2 relays (optional additional 3)	
	Relay outputs	Maximum voltage : 250 VAC, 30 VDC Switching current capacity : 6A AC, 5A DC	
	Analog outputs	0 to 10 volt 0 to 20mA 4 to 20mA	
	Safety	Safe Torque Off SIL2/pld	

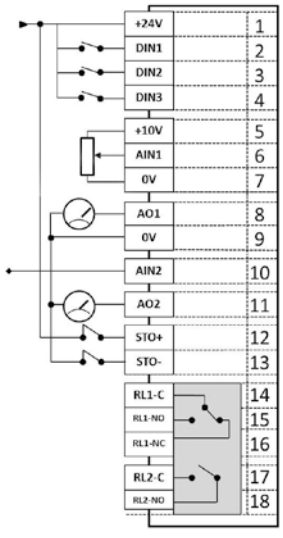
Control features	**Fire mode**	Selectable direction Selectable speed reference
	Broken belt detection	Under load monitoring with autotune configuration
	PID Control	Internal PID control with feedback display
Pump control features	**Pump blockage detection**	Pump load monitoring with autotune function, user configurable
	Pump cleaning	Adjustable pump cleaning cycle operation
	Multi-pump control	Control of fixed speed assist pumps via optional cascade control module Control of duty, assist and standby variable speed pumps via internal Master – slave network
	Pump stir	Automatic pump stir function
Maintenance & diagnostics	**Fault memory**	Last 4 trips stored with time stamp
	Data logging	Logging of data prior to trip for diagnostic purposes : Output current, drive temperature, DC bus voltage
	Maintenance indicator	Maintenance indicator with user adjustable maintenance interval Onboard service life monitoring
	Monitoring	Hours run meter Resettable & non resettable kWh meters
Standards compliance	**EN 61800-3:2004**	Adjustable speed electrical power drive systems. EMC requirements.
	IEC 61508 SIL2 IEC 61800-5-2 Type2 IEC 62061 SIL2 ISO 13849 PL"d"	Safe torque off.
Other standards	**Standards**	CE, UL, cUL, RoHS, Carbon rust, C Tick, SGS, GOST
	EN61800-5-1	Safety requirements - electrical, thermal and energy
	EN55011	Limits and methods of measurement of radio interference characteristics of industrial equipment (EMC)
	UL / cUL	America (UL 508C) and Canada C22.2 NO 14
	C-tick	Australia
	RoHS	Restrictions on hazardous substances

Model code guide

BFI-H2-24-0023-3F1N-TN

- Product family
- Product type and generation
- Frame size 2, 3, 4, 5, 6, 7
- Input voltage rating 2:200-240V 4:380-480V
- Current rating code E.g 23=2,3A
- Input phases: 1: Single phase Input, 3: 3 phase input
- EMC-Filter: F= filtered
- Braking 1= no braking
- enclosure: IP20 = 2; IP55 = N; IP66 Non-switched = X; IP66 switched = D
- display: OLED Text display = T; LED display = S
- PCB coating: Standard coating = N; Full Conformal coating = C

Connection diagram



Function	Default setting
12 Volt DC output, 100mA max / 24 Volt DC input	
Digital input 1	Drive enable
Digital input 2	Analog/preset speed 1 select
Digital input 3	Local/remote reference select
+10 Volt power supply 5mA	
Analog input 1	Local speed reference
0 Volt	
Analog output 1	Motor speed
0 Volt	
Analog input 2	Remote speed reference
Analog output 2	Motor current
Safe torque off input	
Safe torque off input	
Output relay 1	Drive healthy / fault
Output relay 2	Drive running

About Beijer Electronics

Beijer Electronics is a fast growing technology company with extensive experience of industrial automation and data communication. The company develops and markets competitive products and solutions that focus on the user. Since its start-up in 1981, Beijer Electronics has evolved into a multinational group present in 22 countries and sales of 1,367 MSEK 2012. The company is listed on the NASDAQ OMX Nordic Stockholm Small Cap list under the ticker BELE.

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